Rec'd PCT/PTO 03 JUN 2005 PATENT COOPERATION TREA



PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION See Notification of Transmittal of International							
NE-70124WO International application No.	Frenminary Examination Report (Form PCT/IPEA/416)							
PCT/JP2003/015415	ternational filing date (day/month/year) Priority date (day/month/year) Priority date (day/month/year) O2 December 2003 (02.12.2003)							
International Patent Classification (IPC) or na	02 December 2003 (02.12.2003) 03 December 2002 (03.12.2002)							
H01L 33/00, H01S 5/343								
Applicant	NEC CORPORATION							
	1120 CORTION							
This international preliminary examin and is transmitted to the applicant according to the according to	on report has been prepared by this International Preliminary Examining Authority ling to Article 36.							
2. This REPORT consists of a total of								
This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).								
These annexes consist of a total	sheets.							
3. This report contains indications relating to the following items:								
I Basis of the report								
II Priority								
III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability								
IV Lack of unity of invention								
V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;								
VI Certain documents cited								
VII Certain defects in the in	national application							
VIII Certain observations on the international application								
Date of submission of the demand								
	Date of completion of this report							
02 December 2003 (02.12.20	06 September 2004 (06.09.2004)							
lame and mailing address of the IPEA/JP	Authorized officer							
acsimile No.	Telephone No.							

Form PCT/IPEA/409 (cover sheet) (July 1998)

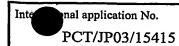
Translation

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

In onal application No.
PCT/JP2003/015415

I. Basis of the report	1 0 2/01 2003/013413
1. With regard to the elements of the international application:*	
the international application as originally filed	
the description:	
nages	
pages	
pages	filed with the letter of
the claims:	, med with the letter of
nages	
70000	, as originally filed
	, as amended (together with any statement under Article 19
pages	, filed with the demand
the drawings:	, filed with the letter of
nages	
nages	, as originally filed
	filed with the demand
	, filed with the letter of
the sequence listing part of the description:	
pagespages	, as originally filed
	filed with at - 4
	, filed with the letter of
the language of a translation furnished for the purposes of the language of publication of the international application the language of the translation furnished for the purpose or 55.3). 3. With regard to any nucleotide and/or amino acid sequen preliminary examination was carried out on the basis of the sequen contained in the international application in written form. filed together with the international application in computer furnished subsequently to this Authority in written form. furnished subsequently to this Authority in computer reada The statement that the subsequently furnished written international application as filed has been furnished.	the following language which is: International search (under Rule 23.1(b)). In (under Rule 48.3(b)). In of international preliminary examination (under Rule 55.2 and/one disclosed in the international application, the international ence listing:
The amendments have resulted in the cancellation of: the description, pages the claims, Nos. the drawings, sheets/fig This report has been established as if (some of) the amendment beyond the disclosure as filed, as indicated in the Supplement Replacement sheets which have been furnished to the receiving Of in this report as "originally filed" and are not annexed to the and 70.17). Any replacement sheet containing such amendments must be referred.	fice in response to an invitation under Article 14 are referred to is report since they do not contain amendments (Rule 70.16
	and i sport.
PCT/IPE A /400 (Pers I) (Truly 1000)	

INTERNATIONAL PRED....INARY EXAMINATION REPORT



tatement .			
Novelty (N)	Claims	1-15	YES
	Claims		· NO
Inventive step (IS)	Claims	11-15	YE
	Claims	1-10	NO
Industrial applicability (IA)	Claims	1-15	YES
	Claims		NO

2. Citations and explanations

The following documents are cited in the ISR:

Document 1: GB, 2323210, A (Hewlett-Packard Co.), 16 September, 1998 (16.09.98)

Document 2: JP, 2002-185085, A (Sharp Corp.), 28 June, 2002 (28.06.02)

Claims 1-10

Document 1 (particularly, descriptions on page 5, lines 13-26) and document 2 (particularly, descriptions in paragraph 0016) describe that the well layer and the barrier layer of a quantum well structure that constitute a light-emitting layer are doped with O or S as an impurity. Although neither of the above-mentioned documents clearly describes that they are doped almost uniformly, it is considered to be obvious for a person skilled in the art that, in general, when a layer structure is doped with an impurity, the concentrations of the impurity in the layer structure are made uniform.

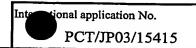
Referring to some documents, the applicant claims that there exists a common technique whereby a multiple-quantum well structure is not uniformly doped, so it would not be obvious that the concentrations of the impurity in the layer structure are made uniform in documents 1 and 2. However, it is considered perfectly normal that a general description of introducing an impurity in a particular semiconductor device structure (e.g., "a quantum well activating region" in document 1) means that the impurity is introduced uniformly in the semiconductor device structure. In addition, document 2 describes that "either or both of the well layer and the barrier layer...are doped with an impurity...", and it is clear that the description inclusively means doping both the well layer and the barrier layer with an impurity. Accordingly, even if there exists a common technique wherein a multiple-quantum well structure is not uniformly doped, it is not considered that uniform doping with an impurity is excluded from what is meant by the descriptions in cited documents 1 and 2.

Documents 1 and 2 also describe the growth by means of MBE method, etc., which is not described in the specification of the present application, but it is not clear from the descriptions in the said specification that uniform doping is difficult in the growth by means of such methods.

Using a nitride semiconductor substrate as a substrate for growth is described in document 2 (e.g., paragraph 0012), and it is considered to be obvious for a person skilled in the art that it is preferable that the surface dislocation density of a nitride semiconductor substrate as a substrate for growth is low. Furthermore, it is considered that the surface dislocation density values of nitride semiconductor substrates described in claims 3 and 4 could normally be selected. It is also shown in document 2 (for example, the descriptions in paragraphs 0012 and 0013: Supply of SiH₄) that a semiconductor layer containing a 4B group element as impurity is provided between the substrate and a phosphor layer.

In addition, it is shown in document 2 (particularly, the descriptions in paragraph 0014) that the barrier layer of a quantum well structure that constitutes a phosphor layer contains In.

INTERNATIONAL PRI INARY EXAMINATION REPORT



Sm	nni	eme	enta	I R	ΛY
24	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	CILL			ᇄ

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V

In addition, the concentration of an impurity and that of a carrier described respectively in claims 8 and 9 are values that a person skilled in the art could have set as required through normal technical activities such as testing measurement.

Claims 11-15

The subject matters of claims 11-15 are neither described in any of the documents cited in the ISR, nor obvious to a person skilled in the art.